VIRTUAL SOCIAL MEDIA AND SOCIAL MEDIA ON MENTAL HEALTH

The association between virtual reality-based social media and its effects on depression and social isolation compared to traditional social media users.

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Abstract

This study investigates the difference between virtual reality-based social media and traditional social media concerning mental health, specifically depression, loneliness and social isolation while investigating whether time spent on social media impacts mental health. Research has shown a relationship between social media use and adverse mental health, and this study sought to explore these findings concerning virtual reality social media. A total of 96 participants completed measures of depression (PHQ9), loneliness (UCLA3), Berkman-Syme Social Network Index (BSSNI), social media use, and virtual reality social platform use. Findings from the t-test showed no significant difference between social isolation and depression. At the same time, it did find a higher mean loneliness for virtual reality social media users than traditional social media users. Correlational analyses showed a significant positive correlation between depression and social media use. However, there was no difference between virtual reality social media users and traditional social media users. The results of this study suggest that social media use may be associated with increased depression, whereas virtual reality social platform use may be associated with increased loneliness. These findings have important implications for the potential benefits and drawbacks of different forms of social media use on mental health.

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VIRTUAL SOCIAL MEDIA AND SOCIAL MEDIA ON MENTAL HEALTH

Table of Contents

Introduction

The association between mental health disorders and social media has been re-searched extensively since social became mainstream. However, a new study area has been found with the recent developments and adoption of virtual reality and virtual reality-based social media such as VRChat. It has been widely accepted that there could be a link between social media and mental health disorders like depression and social isolation. This paper is researching whether there are indeed such findings and, if so, if they are similar findings in their virtual reality counterparts or if it is less of a problem due to the difference between how they operate. This literature review aims to show the links between social media and depression currently found and show how virtual reality is now being used in various ways for mindfulness and other fields to help people. The reason is that virtual reality might not have these if they are happy as they are being actively social on virtual reality-based social media.

Social media can be defined as websites and computer software that allow people to communicate and share information and social networking on the internet. (Cambridge Dictionary, 2019). The main difference between this version of social media and its virtual reality counterpart is that in virtual reality (VR), you are face to face with your avatars, you can move your body, and the movement is replicated in VR to different degrees depending on the setup. These differences could lead to divergence from the previous research conducted. In this literature review, I will focus on the data with conventional social media and links to depression and social isolation as that is an area that is well studied, and this is what results will be compared to.

Current research has found a link between social media and depression; this can be seen through the papers presented here, the first of which is about the social media behaviour related to major depressive disorder in millennials. (Robinson et al., 2019) At the same time,

this article focuses on the behaviour exhibited by millennials with major depressive disorder and how they interact with social media. This is done based on an association of a link between social media and depression. On that assumption, they worked to find which behaviours they were most likely to exhibit while using social media. This is done by how many followers they have, how many they are following, how they react to being tagged, pictures uploaded and comments. They aimed to find the specific social media behaviours related to major depressive disorder. They had various findings, such as p posting pictures with others, indicating less loneliness and not being socially isolated, which is associated with a reduced likelihood of having depression. (Robinson et al., 2019) This is one of the many findings that they found. Others include backing up other studies that show that social media addiction suggests having depressive symptoms.

The following study also looks at the link between social media and depression, only from a different angle; it does not focus on behaviour related to social media but on how it affects people presently affected by major depressive disorder (Aydin et al., 2020). They found that the group who suffers from major depressive disorder is more addicted to social media than their control group. Similarly, a study focuses on young parents on this same topic. This research also found a correlation between social media use and depressive symptoms (Sidani et al., 2020). Many other studies examine social media, such as social networking and symptoms of depression and anxiety in early adolescence (Mundy et al., 2020). This study finds that those with higher social media use had a higher probability of reporting depressive symptoms and anxiety. They found a weak to moderate increase in odds of depression and anxiety between those with high social media use versus low/everyday use. Another paper on this topic is "The problematic use of social networking sites associates with elevated symptoms in patients with major depressive disorder". (Aydin et al., 2020) This study compares the use of social media by patients with a major depressive disorder to

healthy control. Those with major depressive disorder are more addicted to social media than healthy control. This shows the link between mental health disorders like depression with social media. This study has found that there have not been studies conducted on virtual reality counterparts and whether it affects mental health similarly to traditional social media.

This is not to say that social media use can be used as a reason for depression, as some believe that it is not causation but a correlation that people with mental health issues use social media more. They found that depressed people were more likely to use social media to avoid connecting with others while still giving the impression that they are ok with themselves while not actively using the platform to socialise. This case of not actively using the platform leads to the worsening or maintaining of their symptoms. (Keles et al., 2020; Thapa & Subedi, 2018)

From this, we can see how social media is complex in its interactions with depression, but it can be seen to have an effect; it cannot be perfectly understood as it affects people in a wide range of ways. We also see that it could be that social media is a place where those that are depressed gather after they suffer. The above shows the association between social media and depression, one of the many mental health disorders associated with social media. Another study shows that depressive symptoms are among many other disorders like loneliness and social isolation.

Virtual reality is expanding fast and has grown even quicker due to repeated lockdowns due to COVID-19 (Vardomatski, 2021). With this new technology, a different type of social media has developed, and some of the ways it has been used and its potential will be shown. We see this potential through current studies on how VR use can produce better results than traditionally found in many areas, e.g. mindfulness and helping reduce acrophobia (Freeman et al., 2018; Lunsky et al., 2021; Modrego-Alarcón et al., 2021;

Seabrook et al., 2020). These articles show how effective VR can be when dealing with problems and how it can be more effective than doing the same action in reality.

Mindfulness is a focus in some of these articles as it is something that they can see a difference in effectiveness and has been something that could be measured with relative ease compared to other areas of study; it is also an area where its use could be of great value. This research has found that mindfulness practice via VR was more effective than standard mindfulness practice due to the environments that are available while in VR. These environmental changes make the users feel more relaxed, peaceful, and calm. (Seabrook et al., 2020) That is not to say that it was perfect, the technology is still developing, and because of that, there were reports of some discomfort due to the weight of the VR headset and video quality. This group was not the only group to succeed with mindfulness practices in VR. Similar results were found in newer studies conducted, which also found that the usage of VR showed that the participants were getting better results in their mindfulness practice. (Seabrook et al., 2020, Modrego-Alarcón et al., 2021)

There have also been results in successfully using VR to tackle issues like acrophobia. (Freeman et al., 2018) This shows how VR has been used to treat acrophobia through exposure to heights in a safe environment through a variety of exercises in VR. This indicates that mental health conditions can be treated through VR with the correct methods being used. This is great because it shows how technology is being used to help people in a safe, active manner and in an easier way than before.

A paper looks at the use of the proteus effect concerning exercise. The proteus effect is when an individual's online and sometimes offline behaviour and mentality are affected by their online persona or, in this case, their avatar. They found a positive impact on female participants. They were more likely to associate themselves with their more physically

healthy avatar, affecting their self-efficacy for exercise. (Lin et al., 2021) This is interesting because it could be similar to social media usage in VR if this is the case. This has led to new research being created to further this newfound area and discover how it works in greater depth. This is because social media in VR is done through platforms like VRChat, where the users meet face-to-face with their avatars to interact with each other. This could mean they are social, reducing the likelihood of worsening or maintaining their depressive symptoms.

Social media is complex in its interactions with mental health disorders like depression and social isolation and their symptoms. Still, the possibility that its VR counterparts have different interactions with these situations is possible, or even possibly a way to counteract these issues and provide a new method to tackle them and deal with them. The point of this paper is that further research is needed on these topics to fully understand these complex topics and specifically on a combination of these subjects: social media and Virtual reality and how they can interact with a person's mental health.

Rationale

This study investigates the difference between virtual reality-based social media and traditional social media concerning mental health, specifically depression, loneliness and social isolation while investigating whether time spent on social media impacts mental health. This group was selected due to the differences in interaction at a fundamental level between the two rapidly growing forms of social media. Traditional social media in this context refers to digital platforms that allow users to create and share content and social network, whether to stay connected with friends and family, express an opinion, build a community or many other features of traditional social media. Platforms include Facebook, Twitter, YouTube, TikTok, WhatsApp, LinkedIn, etc. ("Social Media | Britannica," 2019). On the other hand,

virtual reality-based social media is generally more face-to-face; it is going to a server, meeting friends or new people, talking to them, and interacting with them while moving through an interactive world where they can participate in various activities. At the same time, it sounds similar to traditional social media; how you see the other person's avatar move and react and how events occur in this virtual reality world make it a completely different experience due to how these interactions occur. Given the growing concerns around the impact of social media on mental health, it is essential to explore the differences in mental health outcomes between VR social media users and traditional social media users (Keles et al., 2020).

This study is crucial as it will help identify if there is a similar association between virtual reality-based social media and depression, social isolation and loneliness. Specifically, the research aims to explore the differences in mental health outcomes between virtual reality-based social media users and traditional social media users and to examine the relationship between the amount of time spent on social platforms and depression, loneliness, and social isolation. Based on prior literature, we hypothesise that (H1) virtual reality social media users have lower levels of depression, social isolation and loneliness than traditional social media users.

Methodology

Participants.

The research sample of the current study consisted of 96 participants (Virtual reality Social Media: $n = 21$, traditional Social Media: $n = 75$). The participants were recruited through a non-probability sampling method, convenience sampling, as the research was

shared online on social media platforms. Participants were recruited through social media websites such as Facebook, Reddit (Virtual Reality related subreddits), WhatsApp and Discord. This ensured that a sample of active social media users of both types was recruited who could provide relevant and valid responses to the research. Participants must be at least 18 years old to align with ethical considerations. Participants were also required to provide informed consent before completing the survey. Of the participants recruited, 21 (21.69%) were VR Social Media users, and 75 (78.1) just used traditional social media. All VR social media users were also traditional social media.

Materials

The study comprised some social media usage questions and three scales on Google Forms to be shared. The general social media usage questions were administered to see how long they spend on social media, whether they use virtual reality-based social media, traditional social media or both.

UCLA Loneliness Scale Version 3, developed by Daniel Russel in 1996, is a 20-item scale designed to measure a person's subjective feeling of loneliness. This is done through a 4-point Likert Scale from 1 (Never) to 4 (Often). The score is computed by adding up all 20 statements, of which ten are reverse scored. The total scores can range from 20 to 80, with higher scores indicating higher loneliness and social isolation. The most common categorisation of scores is 20 – 34 is a low degree, 35 – 49 for a moderate degree, 50 – 64 for a moderately high degree and 65 – 80 for a high degree of loneliness and social isolation (Deckx et al., 2014). The Cronbach's alpha was (a = .93), indicating an excellent level of internal consistency; this matches the Cronbach's alpha that Russel observed, which was between a = .89 to .94, depending on the population (Russell, 1996).

The Patient Health Questionnaire-9 (PHQ-9) is a commonly used self-report tool designed to measure the severity of depressive symptoms in individuals. Developed by Robert L. Spitzer and colleagues in 1999, the PHQ-9 is based on the DSM-IV criteria for major depressive disorder and consists of nine items, each corresponding to one of the criteria for depression. The PHQ-9 is scored on a four-point Likert scale, with responses ranging from 0 (not at all) to 3 (nearly every day). The total scores can range from 0 to 27, with higher scores indicating higher severity of depressive symptoms. The most common categorisation of scores is 0 – 4 for minimal depression (with a caveat that if symptoms have been present for two years or longer, it is likely chronic depression), 5 – 9 for mild depression, 10 – 14 for moderate depression, 15 – 19 for moderately severe depression and 20 – 27 for severe depression. The PHQ-9 has been validated for use in various populations and has demonstrated high internal consistency. The Cronbach's alpha was ($a =.88$), similar to the Cronbach's alpha found by the researchers who got results ranging from .86 to .89 (Kroenke et al., 2001). It has also been found to have good criterion validity, sensitivity, and specificity in identifying individuals with depression (Manea et al., 2015).

The Berkman-Syme Social Network Index 11 item (SNI-11), developed by Lisa Berkman and S. Leonard Syme in 1979, is an 11-item scale designed to measure a person's social integration and support level. This can be done by asking about four types of social connections: marital status (married vs not); sociability (number and frequency of contacts with children, close relatives, and close friends); church group membership (yes vs no); and membership in other community organisations (yes vs no). The score is computed by assigning points for each type of connection based on a scoring scheme that ranges from 0 to 4 points. The total scores can range from 0 to 12, with higher scores indicating higher social integration and support. However, the SNI-11 was used in this study, which includes seven additional items that ask about perceived closeness and satisfaction with each type of

connection. These items are scored on a 5-point Likert scale from 0 to 10 or more people. The total scores for these items can range from 7 to 35, with higher scores indicating higher perceived closeness and satisfaction. The most common categorisation of scores is 7 – 14 for low perceived closeness and satisfaction, 15 – 21 for moderate perceived closeness and satisfaction, 22 – 28 for high perceived closeness and satisfaction, and 29 – 35 for very high perceived closeness and satisfaction (Berkman & Syme, 1979). Berkman and Syme did not report the Cronbach's alpha. However, later studies have found it to be between a = .70 to .80 for the SNI-11 items and between a = .80 to .90 for the perceived closeness and satisfaction items, indicating a good to an excellent level of internal consistency (Chang et al., 2017; Cohen et al., 1997; House et al., 1988).

Design.

In the study presented, a cross-sectional design is used because all the data was collected at one point in time and is of the quantitative approach. Data was collected via an online survey. There were two predictor variables (PV's): social media type and time spent. The criterion variables (CV's) were depression, social isolation and loneliness.

Procedure.

The data was collected through an online questionnaire hosted on google forms. It was piloted by colleagues to determine whether the length of the study was too long or short and to make sure it flowed well. The survey would take less than ten minutes, and no issues were reported. The questionnaire used in the study was anonymous, with the questions being self-report. The researcher shared the online questionnaire on various traditional

 social media websites such as Facebook, and Reddit (Virtual Reality related subreddits such as the Pimax, PSVR and RecRoom subreddits), where they were told some information about the study and the inclusion criteria of being over 18 years old. Once they clicked the provided

link, they were led to a participant information sheet (Appendix B) where they were told that their participation was voluntary, the participation criteria, possible risks while completing the study, that they could quit the study at any time before uploading their data and that there would be no penalty for not participating or stopping at any time. They were also made aware that it would be unidentifiable once the data was submitted; therefore, it could not be withdrawn after submission.

The participants were also provided with a consent form (Appendix A) and were required to provide informed consent before continuing to participate in the study. They then proceeded to the questions in the survey, with five sections. The first two sections ask about traditional social media and virtual reality usage, how long they spend and what platforms they use. Then there are three more sections, each being one of the tests conducted, the Berkman-Syme social network index, PHQ 9 and the UCLA Loneliness Scale Version 3 (Appendix D, Appendix E, Appendix F). Then after completing these sections, there was a debriefing where the nature of the study was again explained and thanked the participants for their participation. (Appendix c).

The current research study was approved by the National College of Ireland's Ethics Committee and is in line with the ethical guidelines of the National College of Ireland Ethical Guidelines for Research with Human Participants and with The Psychological Society of Ireland Code of Professional Ethics (2019).

Results

Descriptive Statistics

The sample comprised 96 participants, primarily traditional social media users at 78.1% (75) and 21.9% virtual reality-based social media users (21). All virtual reality-based social media users also use traditional social media.

Table 1

Descriptives for total scores of Mental Health and Time Spent

Variable	*M* [95% CI]	*SD*	Range
Depression	8.95[7.64, 10.26]	6.35	0-25
Loneliness	46.02[7.64, 10.26]	6.45	20-79
Social Isolation	12.73[11.51, 13.94]	5.94	2-37
Time Spent on social media	20.10[15.41, 24.79]	23.14	1-152

Inferential Statistics.

To test our (H1) hypothesis that virtual reality-based social media users have lower levels of depression, social isolation and loneliness than traditional social media users, we conducted a series of independent samples t-tests.

For depression scores, preliminary analyses were conducted to ensure no violation of the assumptions of normality and homogeneity of variance as Levene's test is not significant (p = .73). There was no significant difference in scores, with virtual reality-based social users (M = 10.48, SD = 7.05) score was not statistically significant compared to the traditional social media users (M= 8.52, SD = 6.26), r (94) = 1.23, p = .221 two-tailed, and, the magnitude of differences in the means (mean difference = 1.96, 95% CI [-1.20, 5.11] was small (Cohen's d = .304). Results, therefore, indicated no difference in mean depression scores between virtual reality-based social users and traditional social media users.

For loneliness scores, preliminary analyses were conducted to ensure no violation of the assumptions of normality and homogeneity of variance as Levene's test is not significant (p = .64). There was no significant difference in scores, with virtual reality-based social media users (M = 51.33, SD = 12.84) score was statistically significant compared to the traditional social media users (M= 844.53, SD = 12.29), r (94) = 2.22, p = .029 two-tailed, and, the magnitude of differences in the means (mean difference = 6.80, 95% CI [.72, 12.88] was medium (Cohen's d = .548). Results, therefore, indicated that there is a difference in mean loneliness scores between virtual media social users and traditional social media users.

For social isolation scores, preliminary analyses were conducted to ensure no violation of the assumptions of normality and homogeneity of variance as Levene's test is not significant (p = .73). There was no significant difference in scores, with virtual media social users (M = 12.81, SD = 7.02score was not statistically significant compared to the traditional social media users (M= 12.70, SD = 5.66), r (93) = .07, p = .943 two-tailed, and, the magnitude of differences in the means (mean difference = .106, 95% CI [-2.83, 3 .04] was small (Cohen's d = .018). Results, therefore, indicated no difference in mean social isolation scores between virtual media social users and traditional social media users.

To test our (H2) hypothesis that time spent on social media use is associated with higher depression, social isolation, and loneliness, a series of Pearson product-moment coefficient correlation analyses were conducted.

The relationship between the participants' total time spent on social media and depression, loneliness and social isolation scores were tested, and the total time spent by virtual reality-based social users is their traditional social media reported time added to their reported time spent on virtual reality-based social media platforms. For traditional social media users, it is just their reported time.

The relationship between the variables was investigated using a Pearson product-moment correlation coefficient. In addition, preliminary analyses were performed to assess the assumptions of normality, linearity and homoscedasticity.

Depression and loneliness have a strong positive correlation ($r = .689$, $p < .001$), meaning that individuals who report higher levels of depressive symptoms also tend to report higher levels of loneliness.

Depression and social isolation have a moderate negative correlation ($r = -.292$, $p < .001$), indicating that individuals who report higher levels of depressive symptoms tend to have smaller social networks, therefore, higher social isolation.

Depression and total social media time have a moderate positive correlation ($r = .324$, $p < .001$), suggesting that individuals who report higher levels of depressive symptoms also tend to spend more time on social media.

Loneliness and social isolation have a strong negative correlation ($r = -.418$, $p < .001$), meaning that individuals who report higher levels of loneliness tend to have smaller social networks, therefore, higher social isolation.

Overall, this correlation analysis provides insights into the relationships between depressive symptoms, loneliness, social network size, and social media and virtual reality use. However, it is essential to note that correlation does not imply causation, and further research is needed to understand the nature and directionality of these relationships.

Table 2

Pearson product-moment correlations between study variables

Variable	1.	2.	3.	4.

1. Depression	-			
2. Loneliness	.689**	-		
3. Social Isolation	-.292**	-.418**	-	
4. Time Spent On Social Media	-.324**	-.153	.009	-

Note: * p < .05; ** p < .001

UCLA Loneliness Scale Version 3 reported excellent internal consistency (Cronbach's alpha coefficient = .93).

The Patient Health Questionnaire-9 reported excellent internal consistency (Cronbach's alpha coefficient = .88).

The Berkman-Syme Social Network Index scale reported excellent internal consistency (Cronbach's alpha coefficient = .89).

Discussion

The current study explored the differences in mental health between virtual reality social media users and traditional social media users. It also examined the relationship between the time spent on social platforms and depression, loneliness, and social isolation. This is because prior studies have demonstrated a relationship between these mental health concerns and social media platforms (Hartanto et al., 2021; Ivie et al., 2020). While it is debated whether social media causes mental health problems or if users are more likely to go on to these platforms due to existing mental health problems, both sides agree that there is a relationship between social media and mental health. In addition, research has been conducted on users of virtual reality and how social involvement in virtual reality games can

affect depression when social connectedness and self-esteem are low; findings suggest that there could be a link to a positive outcome when participating in social virtual reality situations (Lee et al., 2021). This research led to the formation of two hypotheses to explore the aims of this study.

It was hypothesised that (H1) virtual reality-based social media users have lower levels of depression, social isolation, and loneliness than traditional social media users, as was seen from the results; this hypothesis was rejected. This relationship was explored using t-tests, and it was found that there was no significant difference between virtual reality-based social media users and traditional social media users regarding depression and social isolation. However, there was a significant difference in loneliness, with a higher score associated with virtual reality-based social media users. Results from the t-test showed that virtual reality-based social media users have higher loneliness scores than traditional social media users, suggesting that virtual reality-based social media users are lonelier than traditional social media users. The t-test also showed that in terms of social isolation and depression, the two groups were not statistically different in results, indicating no difference found between the two groups. These findings do not support previous studies that found a difference in a positive direction for virtual reality-based social media users (Lee et al., 2021). However, the findings align with the existing literature on the relationship between social media use and adverse mental health outcomes (Aydin et al., 2020; Bonsaksen et al., 2021; Deckx et al., 2014; Hartanto et al., 2021).

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This is seen clearly in the second hypothesis (H2), that time spent on social media use is associated with higher depression, social isolation, and loneliness. This hypothesis is partially supported because while there is no strong correlation between time spent on social media and social isolation or loneliness, there is a correlation with depression ($r = 0.324$, $p < 0.01$). This suggests a correlation between time spent on social media and depression, which aligns with current studies and their findings. However, the findings in the study are correlational; therefore, causation should not be inferred from these results. Therefore, while the hypothesis was partially supported, it cannot be entirely accepted based on the current results. Further research is needed to investigate the complex relationships between social media use, depression, and social isolation/loneliness to gain a more comprehensive understanding of these associations.

Social media findings have suggested a relationship between time spent and higher scores of depression, loneliness and social isolation; this study fails to find that relationship

for all the mentioned mental health issues. However, there were findings in the correlation that show that there is a relationship between these issues, as is seen with the strong positive relationship between depression and loneliness (r = .689**), meaning that individuals who report higher levels of depressive symptoms also tend to report higher levels of loneliness. It also found a moderate negative correlation (r = -.292**), indicating that individuals who report higher depressive symptoms tend to have smaller social networks, meaning higher social isolation. This does align with current studies on the relationship between depression, social isolation and loneliness. (Aydin et al., 2020; Bonsaksen et al., 2021; Deckx et al., 2014; Hartanto et al., 2021)

Implications

The findings led to further research being required as the results found were on a small population size, and while there were some findings of increased loneliness over traditional social media, and little differences for depression and social isolation, for all three, the scores were moderate to high which is consistent with current research where numerous studies have found that social media users have moderate to high-end scores of depression, social isolation and loneliness (Robinson et al., 2019). An intriguing finding while doing these tests is in the means for the two groups; for depression, the mean for virtual reality-based rounded to a whole number is 10, while for traditional social media, it is 9; while this number has no statistical concern, they do refer to different severity on the scale. Traditional social media users reported minimal symptoms, which can suggest they have chronic depression. Similar findings were found for social isolation and loneliness, where the score was moderate for traditional social media users, with a score of 45, while it was 51, which is a moderately high degree for virtual reality-based social media users. Unlike the other two

for social isolation, they scored a 13, meaning there is high social isolation. As current studies show, this is a negative relationship between social media and mental health. Further studies can be conducted to determine the exact type of relationship present and possible ways to assist in lowering those numbers.

Limitations

As this study does not support the hypothesis, further research on a larger sample size could be conducted for more accurate testing. On the other hand, a small sample size could limit the study's statistical power and increase the likelihood of a Type II error. Another limitation is that there is no group with no social media usage; this is another limiting factor as we cannot control for social media usage as a confounding variable and its impacts on mental health. There is also the limitation of where the data was gathered, as all of the Virtual reality participants were gathered from various subreddits, this makes this group non-generalizable. In addition, all of the measures were self-report, which could lead to the subject biasing their results via response bias or social desirability bias; they could also over or under-report their symptoms which could lead to incorrect statistics, which is further affected by the small population. Finally, the study relied on cross-sectional data, which limits the ability to establish causal relationships between the variables. Future research should address these limitations using larger sample sizes, controlling for potential confounds, and using longitudinal designs to better understand the relationships between the variables of interest. Although there are many limitations, it did find results between increased loneliness and virtual reality-based social media. It can also lead to further research that looks at these variables over a larger population, without self-reporting or different self-report measures or with a longitudinal study. Through the implementation of these

recommendations, clearer results could be found. This may result in more research towards social media and virtual reality-based social media and how it affects people and can be used to help more.

Conclusion

In conclusion, the present study investigated the difference between virtual reality-based social media and traditional social media concerning mental health, specifically depression, loneliness and social isolation, while investigating whether time spent on social media impacts mental health. The findings suggest a significant positive correlation between total social media use and depression but not between virtual reality social platform use and mental health symptoms. Additionally, the study found that social media use is associated with increased social isolation. These results highlight the importance of considering the impact of social media use on mental health and social relationships, particularly among young adults who may be more vulnerable to the adverse effects of excessive social media use. However, it is essential to acknowledge the study's limitations, including self-reported measures, a relatively small sample size, and a cross-sectional design. Future research could benefit from using more objective measures of social media and virtual reality use and longitudinal designs to examine the causal relationship between social media use and mental health outcomes over time.

Overall, this study contributes to the growing body of literature on the impact of social media use on mental health and highlights the need for further investigation into the cause underlying these relationships. In addition, the findings have important implications for mental health practitioners and educators, who may benefit from addressing the potential adverse effects of social media use among young adults.

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Appendix A

Consent Form

In agreeing to participate in this research I understand the following:

• The method proposed for this research project has been approved in principle by the Departmental Ethics Committee, which means that the Committee does not have concerns about the procedure itself as detailed by the student. It is, however, the above-named student's responsibility to adhere to ethical guidelines in their dealings with participants and the collection and handling of data.

• If I have any concerns about participation, I understand that I may refuse to participate or withdraw at any stage by exiting my browser.

• I understand that once my participation has ended, that I cannot withdraw my data as it will be fully anonymised.

• I have been informed as to the general nature of the study and agree voluntarily to participate.

• All data from the study will be treated confidentially. The data from all participants will be compiled, analysed, and submitted in a report to the Psychology Department in the School of Business.

• I understand that my data will be retained and managed in accordance with the NCI data retention policy, and that my anonymised data may be archived on an online data

repository and may be used for secondary data analysis. No participants data will be

identifiable at any point.

•   At the conclusion of my participation, any questions or concerns I have will be fully

addressed.

•   Please tick this box if you have read, and agree with all of the above information.

•   Please tick this box to indicate that you are providing informed consent to participate

in this study.

Appendix B

Participant Information Leaflet

The association between virtual reality-based social media and its effects on depression and social isolation compared to regular social media users.

You are being invited to take part in a research study. Before deciding whether to take part, please take the time to read this document. If you have any questions about the information provided, please do not hesitate to contact me using the details at the end of this sheet.

What is this study about?

I am Alex. As part of my degree, we must carry out an independent research project. For this project, I am investigating whether depression and social isolation are associated with virtual reality social media platforms and comparing the results to regular social media platforms.

What will taking part in the study involve?

If you decide to take part in this research, you will be asked to complete an online form about your social media use and complete a series of scales and questions about depression and social isolation. The online form will take between ten minutes and 20 minutes in total. All information will be anonymous. You will be asked to sign a consent form before completing the form indicating that you agree to participate in the research and for the use of your data.

Who can take part?

You can participate in this study if you are over 18 and use at least one form of social media.

Do you have to take part?

No. Participation in this research is voluntary.

What are the possible risks and benefits of taking part?

There are no direct benefits to you for taking part in this research. However, the information gathered will contribute to research that helps us to understand how depression and social isolation are affected by social media use. There is a small risk that some of the questions contained within this survey may cause minor distress for some participants. If you experience this, you are free to discontinue participation and exit the questionnaire. Contact information for relevant support services are also provided at the end of the questionnaire.

Will taking part be confidential, and what will happen to your data?

Responses to the questionnaire will be fully anonymised and stored securely in a password protected/encrypted file on the researcher's computer. Data will be retained and managed in accordance with the NCI data retention policy. Note that anonymised data may be archived on an online data repository, and may be used for secondary data analysis.

What will happen to the results of the study?

The results of this study will be presented in my final dissertation, which will be submitted to the National College of Ireland. They also may be presented at conferences and/or submitted to an academic journal for publication.

Who should you contact for further information?

Researcher: Alex Butuc / x20409092@student.ncirl.ie

Supervisor: Dr Fearghal O'Brien / fearghal.obrien@ncirl.ie

Appendix c

Debrief Sheet

Thank you for participating in this study. This study is interested in the relationship between depression, social isolation and virtual reality social media use and comparing it to regular social media use.

This area of study is important as it can affect the mental health of many due to how widespread social media is. Social media platforms are expanding in this new way, and they can have completely unknown effects, and this is what this research is looking at. Just one reminder that all data will be anonymised; therefore, responses cannot be withdrawn or removed once submitted, and this is your final chance to leave this study.

As there is the possibility of distress as there were questions relating to mental health, multiple mental health services are available, such as The Samaritans: 116 123. This is valid in various EU countries for those in emotional distress or at risk of suicide.

Appendix D

UCLA Loneliness Scale Version 3

Below is a series of questions. Please indicate which of the following applies to you best

using the following scale: 1 = Never; 2 = Rarely; 3 = Sometimes; 4 = Often.

*1. How often do you feel that you are "in tune" with the people around

you?

2. How often do you feel that you lack companionship?

3. How often do you feel that there is no one you can turn to?

4 How often do you feel alone?

*5. How often do you feel part of a group of friends?

*6. How often do you feel that you have a lot in common with the

people around you?

7. How often do you feel that you are no longer close to anyone?

8. How often do you feel that your interests and ideas are not shared

by those around you?

*9. How often do you feel outgoing and friendly?

*10. How often do you feel close to people?

11. How often do you feel left out?

12. How often do you feel that your relationships with others are not

meaningful?

13. How often do you feel that no one really knows you we11?

14. How often do you feel isolated from others?

*15. How often do you fee1 you can find companionship when you want

it?

*16. How often do you feel that there are people who really understand

you?

17, How often do you feel shy?

18. How often do you feel that people are around you but not with you?

*19. How often do you feel that there are people you can talk to?

*20. How often do you feel that there are people you can turn to?

Appendix E

The Patient Health Questionnaire (PHQ-9)

Below is a series of questions. Please indicate which of the following applies to you best using the following scale: 0 = Not At All; 1 = Several Days; 2 = More Than Half the Days; 3 = Nearly Every Day.

1. Little interest or pleasure in doing things?

2. Feeling down, depressed, or hopeless?

3. Trouble falling or staying asleep, or sleeping too much?

4. Feeling tired or having little energy?

5. Poor appetite or overeating? Feeling bad about yourself – or that you are a failure or have let yourself or your family down?

6. Trouble concentrating on things, such as reading the newspaper or watching television?

7. Moving or speaking so slowly that other people could have noticed?

8. Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual?

9. Thoughts that you would be better off dead, or of hurting yourself in some way?

Appendix F

Berkman-Syme social network index

The following questionnaire asks about your social support. Please read the following

questions and circle the response that most closely describes your current situation.

1. How many close friends do you have, people that you feel at ease with, can talk to about

private matters?

0 [ ] None

1 [ ] 1 or 2

2 [ ] 3 to 5

3 [ ] 6 to 9

4 [ ] 10 or more

9 [ ] Unknown

2. How many of these close friends do you see at least once a month?

0 [ ] None

1 [ ] 1 or 2

2 [ ] 3 to 5

3 [ ] 6 to 9

4 [ ] 10 or more

9 [ ] Unknown

3. How many relatives do you have, people that you feel at ease with, can talk to about private matters?

0 [ ] None

1 [ ] 1 or 2

2 [ ] 3 to 5

3 [ ] 6 to 9

4 [ ] 10 or more

9 [ ] Unknown

4. How many of these relatives do you see at least once a month?

0 [ ] None

1 [ ] 1 or 2

2 [ ] 3 to 5

3 [ ] 6 to 9

4 [ ] 10 or more

9 [ ] Unknown

5. Do you participate in any groups, such as a senior center, social or work group, religious-

connected group, self-help group, or charity, public service, or community group?

0 [ ] No

1 [ ] Yes

9 [ ] Unknown

6. About how often do you go to religious meetings or services?

0 [ ] Never or almost never

1 [ ] Once or twice a year

2 [ ] Every few months

3 [ ] Once or twice a month

4 [ ] Once a week

5 [ ] More than once a week

9 [ ] Unknown

7. Is there someone available to you whom you can count on to listen to you when you need

to talk?

0 [ ] None

1 [ ] 1 or 2

2 [ ] 3 to 5

3 [ ] 6 to 9

4 [ ] 10 or more

9 [ ] Unknown

8. Is there someone available to give you good advice about a problem?

0 [ ] None

1 [ ] 1 or 2

2 [ ] 3 to 5

3 [ ] 6 to 9

4 [ ] 10 or more

9 [ ] Unknown

9. Is there someone available to you who shows you love and affection?

0 [ ] None

1 [ ] 1 or 2

2 [ ] 3 to 5

3 [ ] 6 to 9

4 [ ] 10 or more

9 [ ] Unknown

10. Can you count on anyone to provide you with emotional support (talking over problems or helping you make a difficult decision)?

0 [ ] None

1 [ ] 1 or 2

2 [ ] 3 to 5

3 [ ] 6 to 9

4 [ ] 10 or more

9 [ ] Unknown

11. Do you have as much contact as you would like with someone you feel close to, someone

in whom you can trust and confide?

0 [ ] None

1 [ ] 1 or 2

2 [ ] 3 to 5

3 [ ] 6 to 9

4 [ ] 10 or more

9 [ ] Unknown

Appendix G

Social Media Questions

Do you use Virtual Reality Social Platforms? E.g. VR Chat, Rec Room Horizon

If yes, what platform/s?

How long do you spend on VR social platforms on average per week?

Do you use social media? E.g. Facebook, Instagram, Discord

What social media platform/s do you use?

How long do you spend on social media on average per week?

SPSS Screenshots

SNI	Yes	21	12.8095	7.01868	1.53160		
	No	74	12.7027	5.66104	.65808		

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						95% Confidence Interval of the Difference	
						Significance		Mean	Std. Error		
		F	Sig.	t	df	One-Sided p	Two-Sided p	Difference	Difference	Lower	Upper
PHQ9	Equal variances assumed	.124	.726	1.231	94	.111	.221	1.95619	1.58901	-1.19883	5.11121
	Equal variances not assumed			1.150	29.402	.130	.259	1.95619	1.70056	-1.51978	5.43216
UCLA3	Equal variances assumed	.226	.540	2.220	94	.014	.029	6.80000	3.06285	.71864	12.88136
	Equal variances not assumed			2.165	31.012	.019	.038	6.80000	3.14107	.39384	13.20616
SNI	Equal variances assumed	.004	.953	.072	93	.471	.943	.10682	1.47833	-2.82885	3.04249
	Equal variances not assumed			.064	27.007	.475	.849	.10682	1.66700	-3.30894	3.52258

Independent Samples Effect Sizes

		Standardizer[a]	Point Estimate	95% Confidence Interval Lower	Upper
PHQ9	Cohen's d	8.43823	.304	-.183	.789
	Hedges' correction	8.48816	.302	-.181	.783
	Glass's delta	8.29875	.313	-.175	.798
UCLA3	Cohen's d	12.40596	.548	.057	1.037
	Hedges' correction	12.50605	.544	.056	1.029
	Glass's delta	12.28537	.554	.060	1.044
SNI	Cohen's d	5.97908	.018	-.467	.502
	Hedges' correction	6.02786	.018	-.463	.498
	Glass's delta	5.66104	.019	-.466	.503

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation.
Hedges' correction uses the pooled standard deviation, plus a correction factor.
Glass's delta uses the sample standard deviation of the control group.

Correlations